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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[Field of the Invention]

[0001]

This invention relates to the package for electronic-parts storage made as [accommodate / electronic parts, such as a piezoelectric transducer and a semiconductor device, / in the inside of the package which comprises an insulating base and metal lid bodies, such as ceramics / airtightly].

[Background of the Invention]

[0002]

Electronic parts, such as a piezoelectric transducer and a semiconductor device, are used being accommodated in the package for electronic-parts storage for accommodating these electronic parts airtightly.

[0003]

In the package for electronic-parts storage which accommodates such electronic parts airtightly, What is made the most reliable comprises ceramics, such as a nature sintered compact of an aluminum oxide, The insulating base which has two or more metalized wiring conductors by which the electrode of electronic parts is electrically connected to the surface and an inside while having a metallized layer for closure of the frame shape which encloses the mount part by which electronic parts are carried in the upper surface, and this mount part, The metallic frame for closure which comprises the iron nickel alloy and iron-nickel cobalt alloy which were soldered on the metallized layer for closure of this insulating base as enclosed the mount part, It is a thing of the type which comprises a metal lid body which comprises the iron nickel alloy and iron-nickel cobalt alloy which are directly joined to this metallic frame by seam welding, In the case of this type of package for electronic-parts storage, While carrying electronic parts in the mount part of an insulating base, after electrically connecting the

electrode and metalized wiring conductor of electronic parts via a solder bump, a bonding wire, etc., a metal lid body is laid in the metallic frame for closure soldered by the insulating base, While making it roll, contacting the roller electrode of the couple of a seam welder on the periphery edge of this metal lid body, by sending the high current for welding between this roller electrode, and carrying out seam welding of metallic frame and the metal lid body directly, electronic parts are airtightly accommodated in an inside and it changes with the electronic device as a product.

[0004]

However, in this type of package for electronic-parts storage. Slimming down which it is necessary to solder the metallic frame for closure to the metallized layer for closure as a substrate metal for carrying out seam welding of the metal lid body to an insulating base, therefore only the part of metallic frame becomes what has the high height of an electronic device, and is required of the latest electronic device was difficult. It also had the problem that only the part of metallic frame will become expensive.

[0005]

Then, in order to cancel the above problems, The insulating base made from ceramics which has two or more metalized wiring conductors by which the electrode of electronic parts is electrically connected to the surface and an inside while having a metallized layer for closure of the frame shape which encloses the mount part which carries electronic parts in the upper surface, and this mount part, It comprises a metal lid body by which wax material, such as a silver-copper eutectic alloy, was laminated on the undersurface, While carrying electronic parts in the mount part of an insulating base, after electrically connecting each electrode of electronic parts to a metalized wiring conductor, By carrying out seam welding of the metal lid body to the metallized layer for closure via the wax material made to laminate on the undersurface, an insulating base and a metal lid body are joined and the package for electronic-parts storage made as [close / electronic parts / inside / airtightly] is proposed.

[0006]

The package for electronic-parts storage made as [accommodate / electronic parts / by joining a metal lid body to this metallized layer for closure by seam welding via wax material, such as silver solder / in an inside / airtightly], Metallic frame as a substrate metal for welding is not needed from joining the metallized layer for closure, and a metal lid body by seam welding via wax material, the part and height can be made low, and it is cheap.

[0007]

In the conventional package for electronic-parts storage made as [join / the metal lid body by which wax material was laminated in this way on the undersurface / by seam welding / to the metallized layer for closure of an insulating base / via wax material], The metallized layer for closure is setting preferably not less than 10 micrometers of the thickness to not less than 20

micrometers, and not less than 5 micrometers of nickel layers not less than 8 micrometers thick were preferably laminated for thickness on the surface by the electrolysis plating method, a nonelectrolytic plating method, etc. While thickening thickness of the metallized layer for closure with not less than 10 micrometers, when thickness makes a not less than 5-micrometer nickel layer laminate on the surface, this, Absorption relaxation of the thermal shock by the welding current impressed to the metallized layer for closure or an insulating base when carrying out seam welding of the metal lid body to the metallized layer for closure via wax material is carried out by the thick metallized layer for closure and nickel layer of thickness. It is based on the idea of preventing the crack of the metallized layer for closure, or an insulating base from occurring.

[0008]

In order to prevent the oxidation corrosion of a nickel layer, the gold layer is usually laminated on the exposed surface of the nickel layer by the electrolysis plating method, a nonelectrolytic plating method, etc.

[Patent documents 1] JP,2000-223606,A

[Patent documents 2] JP,2003-31713,A

[Description of the Invention]

[Problem(s) to be Solved by the Invention]

[0009]

However, according to the package for electronic-parts storage which set thickness of the metallized layer for closure of an insulating base to not less than 10 micrometers as mentioned above and on which thickness made a not less than 5-micrometer nickel layer laminate on it. Since the thickness of the metallized layer for closure is thick, the electrical resistance of the metallized layer for closure will become low, and The sake, When joining the metal lid body by which wax material was laminated on the undersurface by seam welding via wax material to the metallized layer for closure of an insulating base, the current which a lot of current to the low metallized layer for closure of electrical resistance for welding flows, and flows into a metal lid body will decrease. Therefore, since the part and very big welding current must be impressed and many excessive electric power is consumed in order to carry out melting of the wax material made to laminate on a metal lid body good according to welding current, When an insulating base was thin, the crack occurred in the metallized layer for closure, or the insulating base with the stress which remains between an insulating base and a lid after welding, and it had the problem that it was cheap.

[0010]

In the package for electronic-parts storage made as [join / a metal lid body / in view of this problem / this invention person / as a result of examination / variously / as mentioned above / by seam welding / to the metallized layer for closure of an insulating base / via wax material],

While it is possible for a metal lid body to generate heat the electrical resistance of the metallized layer for closure effectively by [high] sending many welding current by a metal lid body as a thing, and to perform a hermetic seal in lower welding current, While the current which flows into the metallized layer for closure itself by making the metallized layer for closure and the nickel layer of the thickness more than equivalent laminate on the metallized layer for closure decreases and generation of heat of the metallized layer for closure itself is controlled. Since the heat stress generated in the case of welding was effectively eased by the nickel layer with thick thickness, it traced that it was hard to generate a crack in the metallized layer for closure, or an insulating base after welding.

[0011]

this invention is thought out based on this knowledge, and comes out. When the purpose joins a metal lid body to the metallized layer for closure of ** by seam welding via wax material, It is possible to perform a hermetic seal in lower welding current, and it is in providing the reliable package for electronic-parts storage which a crack generates in neither the metallized layer for closure, nor an insulating base.

[Means for Solving the Problem]

[0012]

An insulating base which has the metallized layer for closure attached as a package for electronic-parts storage of this invention enclosed a mount part by which electronic parts are carried in the upper surface, and this mount part, In a package for electronic-parts storage which comprises a metal lid body which wax material is laminated on the undersurface and joined to said metallized layer for closure by seam welding via said wax material, A nickel layer, a nickel cobalt layer, and a gold layer are laminated on the surface one by one, and said metallized layer for closure is characterized by thickness of said metallized layer for closure being [sum total thickness of 4-8 micrometers a nickel layer, and a nickel cobalt layer] 8-20 micrometers.

[0013]

A package for electronic-parts storage of this invention is characterized by cobalt content of said nickel cobalt layer being five to 30 mass %.

[0014]

A package for electronic-parts storage of this invention is characterized by thickness of said nickel cobalt layer being 2 micrometers - 10 micrometers.

[Effect of the Invention]

[0015]

According to the package for electronic-parts storage of this invention, the metallized layer for closure, Make [4-8 micrometers and] the thickness thin, and on the surface A nickel layer,

From having made the nickel cobalt layer and the gold layer laminate one by one, as the sum total thickness of a nickel layer and a nickel cobalt layer was set to 8-20 micrometers. Since a lot of current to a metal lid body of welding comes to flow when the electrical resistance of the metallized layer for closure will become high and carries out seam welding of the metal lid body to the metallized layer for closure via wax material, While being able to control that the metallized layer for closure generates heat greatly considering the part and welding current as a small thing, the metallized layer for closure and a metal lid body can be welded good via wax material. The heat stress impressed to the metallized layer for closure or an insulating base in the case of welding is absorbable good by the nickel layer and nickel cobalt layer whose thickness of the sum total made to laminate on the metallized layer for closure is 8-20 micrometers, As a result, the crack by the heat stress in the case of welding to the metallized layer for closure or an insulating base can be effectively prevented from occurring.

[0016]

While being able to prevent effectively the oxidization corrosion of a nickel layer and a nickel cobalt layer by the gold layer made to laminate on the surface of a nickel layer and a nickel cobalt layer according to the wiring board of this invention, Have formed the nickel cobalt layer directly under the gold layer, and by operation of cobalt of this nickel cobalt layer. Since diffusion into the gold layer of nickel components is controlled effectively, some nickel of a nickel layer or a nickel cobalt layer diffuses the inside of a gold layer, and it exposes to the surface, This oxidizes, wettability hardly generates a bad nickel oxide and nickel hydroxide to wax material, junction to the metallized layer for closure and wax material becomes firm by this, and the firm junction through the wax material of the metallized layer for closure and a metal lid body will become more positive.

[Best Mode of Carrying Out the Invention]

[0017]

Next, the package for electronic-parts storage of this invention is explained based on an attached drawing.

[0018]

Drawing 1 is the sectional view for which an example of the embodiment of the package for electronic-parts storage of this invention was shown, and, as for 1, a metal lid body and 3 are electronic parts an insulating base and 2 in the figure. And when the electronic parts 3, such as a piezoelectric transducer and a semiconductor device, are airtightly closed inside the package which comprises the insulating base 1 and the metal lid body 2, it becomes an electronic device as a product.

[0019]

The insulating base 1 is a base material for supporting the electronic parts 3, comprises ceramics, such as a nature sintered compact of an aluminum oxide, and a nature sintered

compact of aluminum nitride, and has the crevice A for accommodating the electronic parts 3 in the upper surface center part. And the bottom of the crevice A forms the mount part 1a for carrying the electronic parts 3, and the electronic parts 3 are carried in this mount part 1a.

[0020]

If the insulating base 1 is a case where the nature sintered compact of an aluminum oxide is comprised, for example, While carrying out addition mixing of a suitable organic binder and the solvent in the end of ceramic precursor powder, such as an aluminum oxide, oxidized silicon, magnesium oxide, and a calcium oxide, and making with the shape of slurry, While performing suitable punching processing for a ceramic green sheet, and nothing, after an appropriate time and this ceramic green sheet by adopting a well-known doctor blade method and the calendaring roll method for this conventionally, two or more sheets are laminated, and it is manufactured by calcinating at an elevated temperature.

[0021]

Covering formation of the metalized wiring conductor 4 which comprises metallic powder sintered compacts derived from the upper surface of the mount part 1a applying to the undersurface of the insulating base 1, such as tungsten and molybdenum, is carried out to the insulating base 1.

[0022]

The metalized wiring conductor 4 functions as a track for electrically connecting each electrode of the electronic parts 3 outside, and if it is usual, the nickel plating layer about 1-20 micrometers thick and the gold plating layer about 0.1-3 micrometers thick are given to the surface to expose. And the part which the electrode of the electronic parts 3 was electrically connected to the part drawn on the upper surface of the mount part 1a via the electroconductive glue 5, and was drawn on the undersurface of the insulating base 1 is electrically connected to the wiring conductor of an external electric circuit substrate via solder.

[0023]

If the metalized wiring conductor 4 is a case where a tungsten powder sintered compact is comprised, for example, Print coating of the tungsten paste which obtained the suitable organic binder for tungsten powder and the solvent by carrying out addition mixing is conventionally carried out to the ceramic green sheet for insulating base 1 with well-known screen printing at a prescribed pattern, By calcinating this with the ceramic green sheet for insulating base 1, it applies to the undersurface from the mount part 1a upper surface of the insulating base 1, and covering formation is carried out to a predetermined pattern.

[0024]

Metallic powder sintered compacts, such as tungsten and molybdenum, are comprised, and as the metallized layer 6 for closure of 4-8-micrometer-thick frame shape [width / in about 0.4

mm] encloses the mount part 1a in the upper surface peripheral part of the insulating base 1, covering formation is carried out to it.

[0025]

This metallized layer 6 for closure functions as a substrate metal for joining the metal lid body 2 to the insulating base 1, and as shown in drawing 3, the nickel layer 9, the nickel cobalt layer 10, and the gold layer 11 are laminated on that surface to expose one by one. And on it, the metal lid body 2 is joined by seam welding via the wax material 8.

[0026]

If the metallized layer 6 for closure is a case where a tungsten powder sintered compact is comprised, for example, Adopt well-known screen printing as the ceramic green sheet for insulating base 1 conventionally, and print coating of the tungsten paste which obtained the suitable organic binder for tungsten powder and the solvent by carrying out addition mixing is beforehand carried out to predetermined thickness and pattern, By calcinating this with the ceramic green sheet for insulating base 1, as the mount part 1a is surrounded on the upper surface of the insulating base 1, covering formation is carried out to it.

[0027]

On the other hand, the metal lid body 2 is a plate whose thickness which comprises an iron nickel alloy board or an iron-nickel cobalt alloy board is about 0.1 mm, and is laminated on the thickness whose wax material 8, such as a silver-copper eutectic crystal wax, is about 10-20 micrometers all over the undersurface. And as shown to drawing 2 in a sectional view, the metal lid body 2 is laid on both sides of the wax material 8 on the metallized layer 6 for closure, While making it roll, contacting roller electrode R of the couple of a seam welder on the periphery edge in which this metal lid body 2 carries out for relativity, the current for welding between this roller electrode R is sent, By carrying out melting of a part of wax material 8 by generation of heat by the current, it is joined to the metallized layer 6 for closure of the insulating base 1 via the wax material 8, and this closes the electronic parts 3 airtightly between the insulating bases 1.

[0028]

Such a metal lid body 2, While obtaining the composite metal plate of a wide area in which wax material was stuck to the undersurface of the iron nickel alloy board or the iron-nickel cobalt alloy board by pressure by rolling wax material foil, such as a silver-copper wax, in piles on the undersurface of an iron nickel alloy board or an iron-nickel cobalt alloy board, It is manufactured by piercing this composite metal plate and piercing in predetermined shape with a metallic mold.

[0029]

And in the package for electronic-parts storage of this invention, As shown in drawing 3, while making [4-8 micrometers and] thin thickness of the metallized layer 6 for closure, thickness of

the sum total of the nickel layer 9 and the nickel cobalt layer 10 made to laminate on the surface of this metallized layer 6 for closure is used as an 8-20-micrometer layer, and that is important. From having made [4-8 micrometers and] thin thickness of the metallized layer 6 for closure, and having made the nickel layer 9 and the nickel cobalt layer 10 whose total thickness is 8-20 micrometers laminate on it. Electrical resistance of the metallized layer 6 for closure on which the nickel layer 9 and the nickel cobalt layer 10 were laminated can be made high, As a result, since big current flows into the metal lid body 2 side when welding the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8, While being able to control that make the part and welding current small and the metallized layer 6 for closure generates heat greatly, melting of the wax material 8 made to laminate on the metal lid body 2 can be carried out good according to welding current, and the metallized layer 6 for closure and the metal lid body 2 can be joined good.

[0030]

The nickel layer 9 and the nickel cobalt layer 10, If it is a case where can form by the electrolysis plating method, a nonelectrolytic plating method, etc., for example, it is based on the electrolysis plating method, the nickel layer 9 can be formed by the electrolysis plating method using the plating liquid (Watts bath etc.) which uses nickel sulfate as the main ingredients, etc. The nickel cobalt layer 10 can be formed by using the nickel cobalt plating liquid which added cobalt compounds, such as cobalt sulfate, suitably into the plating liquid for these nickel.

[0031]

According to the wiring board of this invention, from having made the nickel layer 9, the nickel cobalt layer 10, and the gold layer 11 laminate on the surface of the metallized layer 6 for closure one by one. While being able to prevent effectively the oxidization corrosion of the nickel layer 9 and the nickel cobalt layer 10, When carrying out seam welding of the metal lid body 2 to the metallized layer 6 for closure via the wax material 8, the flow nature of the wax material 8 becomes good, and junction through the wax material 8 of the metallized layer 6 for closure and the metal lid body 2 will become still firmer.

[0032]

such a gold layer 11, if it is a case where can come out by the electrolysis plating method, a nonelectrolytic plating method, etc., and can form, for example, it is based on the electrolysis plating method, While the meta-rice layer 6 (the nickel layer 9 and the nickel cobalt layer 10 cover beforehand) for closure is immersed into the gold plating liquid of a cyanogen system, it can form by supplying the electric power for plating in predetermined current density and time.

[0033]

In this case, if the gold layer 11 has the tendency it to become difficult for that thickness to prevent effectively the oxidation corrosion of the nickel layer 9 or the nickel cobalt layer 10 in

less than 0.1 micrometer and it exceeds 3 micrometers, When joining the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8, the current which flows into the thick gold layer 11 increases, and since the current which flows into the metal lid body 2 decreases, there is a possibility that melting of the wax material 8 may be barred and the intensity of junction may deteriorate. Therefore, as for said gold layer 11, it is preferred to make the thickness into the range of 0.1 micrometer - 3 micrometers, and its range which are 0.1 micrometer - 2 micrometers is much more preferred.

[0034]

According to the wiring board of this invention, the nickel cobalt layer 10 is formed directly under the gold layer 11, Since a cobalt component controls diffusion of nickel components, some nickel of the nickel layer 9 or the nickel cobalt layer 10 diffuses the inside of the gold layer 11, and it exposes to the surface of the gold layer 11, This oxidizes and wettability hardly generates a bad nickel oxide and nickel hydroxide to the wax material 8. Junction to the metallized layer 6 for closure and the wax material 8 becomes firm by this, and the firm junction through the wax material 8 of the metallized layer 6 for closure and the metal lid body 2 will become much more positive.

[0035]

In this case, it becomes difficult for the cobalt content in the nickel cobalt layer 10 to prevent diffusion into the gold layer 11 of nickel effectively by less than 5 mass %, When 30 mass % is exceeded, there is a tendency for the corrosion resistance of the nickel cobalt layer 10 to fall, and there is a possibility of becoming easy to oxidize and becoming what has the low long term reliability of covering to the nickel cobalt layer 10 of the gold layer 11. Therefore, as for the cobalt content in said nickel cobalt layer 10, what is considered as the range of 5 - 30 mass % is preferred.

[0036]

If the thickness becomes less than 2 micrometers and a thin thing, said nickel cobalt layer 10, When there is a tendency for preventing effectively to become difficult about nickel of the nickel layer 9 or the nickel cobalt layer 10 being spread in the gold layer 11 and it exceeds 10 micrometers, there is a tendency for the reliability of covering to nickel layer 9 grade to fall with stress inherent. Therefore, as for said nickel cobalt layer 10, what the thickness is made into the range of 2 micrometers - 10 micrometers for is preferred.

[0037]

If the cobalt content in the nickel cobalt layer 10 is a case where the nickel cobalt layer 10 is formed by the electrolysis plating method, it is controllable in the predetermined range by adjusting the cobalt content under plating bath etc., for example.

[0038]

If it is in the tendency which becomes difficult to make the metallized layer 6 for closure

laminate on the insulating base 1 firmly and it exceeds another side and 8 micrometers when the thickness of the metallized layer 6 for closure is less than 4 micrometers, When the electrical resistance of the metallized layer 6 for closure will become low and welds the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8, The current which flows into the metal lid body 2 side decreases, and it is in small welding current to carry out melting of the wax material 8 made to laminate on the metal lid body 2 good in the tendency which becomes difficult. Therefore, the thickness of the metallized layer 6 for closure is specified as the range of 4-8 micrometers.

[0039]

While applying to a peripheral side face from the upper surface of the insulating base 1 and forming a radius of circle about 5-50 micrometers in radius, If the periphery edge of the metallized layer 6 for closure is made to extend so that it may become thin gradually to the middle of said rounded part, the metallized layer 6 for closure can be effectively prevented from exfoliating from the insulating base 1. Therefore, while applying to a peripheral side face from the upper surface of the insulating base 1 and forming a radius of circle about 5-50 micrometers in radius, it is preferred to make the periphery edge of the metallized layer 6 for closure extend so that it may become thin gradually to the middle of the rounded part.

[0040]

If the metal paste for forming the metallized layer 6 for closure sets to 1 micrometer or less mean particle diameter of the metal powder contained in this, thickness can make 4-8 micrometers and the thin metallized layer 6 for closure laminate on the upper surface of the insulating base 1 precisely and firmly. Therefore, as for the metal paste for metallized layer 6 for closure, what the mean particle diameter of the metal powder contained in this shall be 1 micrometer or less is preferred.

[0041]

According to the package for electronic-parts storage of this invention, again the thickness of the sum total of the nickel layer 9 and the nickel cobalt layer 10 made to laminate on the surface of the metallized layer 6 for closure from having been referred to as 8-20 micrometers. When welding the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8, Absorption relaxation can be carried out good by the nickel layer 9 and the nickel cobalt layer 10 which made the heat stress impressed to the metallized layer 6 for closure, or the insulating base 1 laminate on the metallized layer 6 for closure, As a result, after [which welds the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8] welding in the case, a crack can be effectively prevented from occurring in the metallized layer 6 for closure, or the insulating base 1.

[0042]

The nickel layer 9 and the nickel cobalt layer 10 which were made to laminate on the

metallized layer 6 for closure, When the thickness of the sum total is less than 8 micrometers and the metal lid body 2 is welded to the metallized layer 6 for closure by seam welding via the wax material 8, If the danger that it becomes impossible to carry out absorption relaxation of the heat stress impressed to the metallized layer 6 for closure or the insulating base 1 good becomes large and exceeds another side and 20 micrometers, It is in the tendency a crack and exfoliation become easy to generate in the metallized layer 6 for closure with the stress generated when making the thick nickel layer 9 and the nickel cobalt layer 10 of such thickness laminate. Therefore, the thickness of the sum total of the nickel layer 9 and the nickel cobalt layer 10 made to laminate on the metallized layer 6 for closure is specified as the range of 8-20 micrometers.

[0043]

In this case, the nickel layer 9 and the nickel cobalt layer 10 heat-treat at the temperature of 700 ° - about 900 ° to the nickel layer 9, and it may be made to ease the internal stress which remains while making it print on the metallized layer 6 for closure. By this, while being able to make the nickel layer 9 laminate firmly by the metallized layer 6 for closure, Since the nickel cobalt layer 10 can be made to laminate firmly by the metallized layer 6 for closure via this nickel layer 9, it can be considered as the package for electronic-parts storage which was further excellent in the reliability of the hermetic seal of electronic parts.

[0044]

In this way, while carrying the electronic parts 3 in the mount part 1a of the insulating base 1 according to the package for electronic-parts storage of this invention, By joining the metal lid body 2 to the metallized layer 6 for closure by seam welding via the wax material 8, the package for electronic-parts storage with high reliability which an open circuit does not generate in the metalized wiring conductor 4, or a crack does not generate in the insulating base 1 can be provided.

[0045]

If this invention is a range which is not limited to an example of an above-mentioned embodiment and does not deviate from the gist of this invention, it cannot be overemphasized that various change is possible.

[Brief Description of the Drawings]

[0046]

[Drawing 1] It is a sectional view showing an example of the embodiment of the package for electronic-parts storage of this invention.

[Drawing 2] It is a sectional view showing how to join the insulating base 1 and the metal lid body 2 of the package for electronic-parts storage shown in drawing 1 by seam welding via the wax material 8.

[Drawing 3] It is an important section expanded sectional view of the package for electronic-

parts storage shown in drawing 1.

[Description of Notations]

[0047]

1 Insulating base

1a Mount part

2 Metal lid body

3 Electronic parts

4 Metalized wiring conductor

6 Metallized layer for closure

8 Wax material

9 Nickel layer

10 Nickel cobalt layer

11 Gold layer

[Translation done.]